

# CALLITRICHE (CALLITRICHACEAE) IN SOUTH AUSTRALIA

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## Abstract

Two new records for the State, *C. hamulata* Ktzig., a European species previously known only from Victoria, and *C. umbonata* Hegelm., a native species previously known only from southern New South Wales, Victoria and northern Tasmania, are documented. A key and descriptions are provided for the four species now recognised as occurring in South Australia.

Black (1953) recognised only one species of *Callitriche* L. for South Australia, *C. verna* L. Eichler (1965), following Mason (1959) increased this to two, adding the native *C. sonderi* Hegelm., and correcting the name to be applied to the other species from *C. verna* to *C. stagnalis* Scop. Aston (1973), who also based her account largely on that of Mason, made no further additions. Recently, collections have been made which add a further two species to the State's *Callitriche* flora, the native *C. umbonata* Hegelm. and the adventive *C. hamulata* Ktzig. The four species can be distinguished as follows. Mature fruits are essential.

- 1a. Fruit broader than long, less than 1 mm long . . . . . 1. *C. sonderi*
- b. Fruit round or longer than broad, 1-1.6 mm long.
- 2a. Lower leaves 3-nerved,  $\pm$  spatulate; fruit faces  $\pm$  flat . . . . . 2. *C. stagnalis*
- b. Lower leaves 1-nerved, linear.
- 3a. Fruit umbonate at base, with inner margins of carpels distinctly appressed and raised at base . . . . . 3. *C. umbonata*
- b. Fruit no umbonate, with  $\pm$  flat faces . . . . . 4. *C. hamulata*

The descriptions below are based largely on those of Mason (1959), with minor alterations for some measurements. Specimens examined (all from AD) have been annotated.

### 1. *C. sonderi* Hegelm., Verh. bot. Ver. Brandenb. 9:18 (1867).

Published illustrations: Mason (1959) fig. 2 (a-d), fig. 2A (a-b); Aston (1973) fig. 18a.

Minute plant, terrestrial in areas subject to inundation, leaves all linear-obovate, 0.8-1.7 mm long, 0.4-0.7 mm wide, obscurely 3-nerved, the upper leaves not forming a rosette. Male and female flowers together in axils of both leaves of a pair, bracteoles present, linear-triangular, 0.2-0.3 mm long, pale. Stamen 0.4-1.0 mm long. Styles erect, 0.1-0.3 mm long. Fruit dark brown to greyish,  $\pm$  cordate, 0.5-0.6 mm long, 0.7-0.8 mm wide, keeled and weakly winged, commissural groove shallow, bases of the nutlets at inner edge thickened and pushing against each other to form a small umbonate swelling. (Fig. 1, A-C.)

A minute species, mainly from inland areas of Queensland, New South Wales and Victoria. In South Australia it is only recorded from Cordillo Downs in the far north-east and from the floodplains of the River Murray near Loxton and Berri.

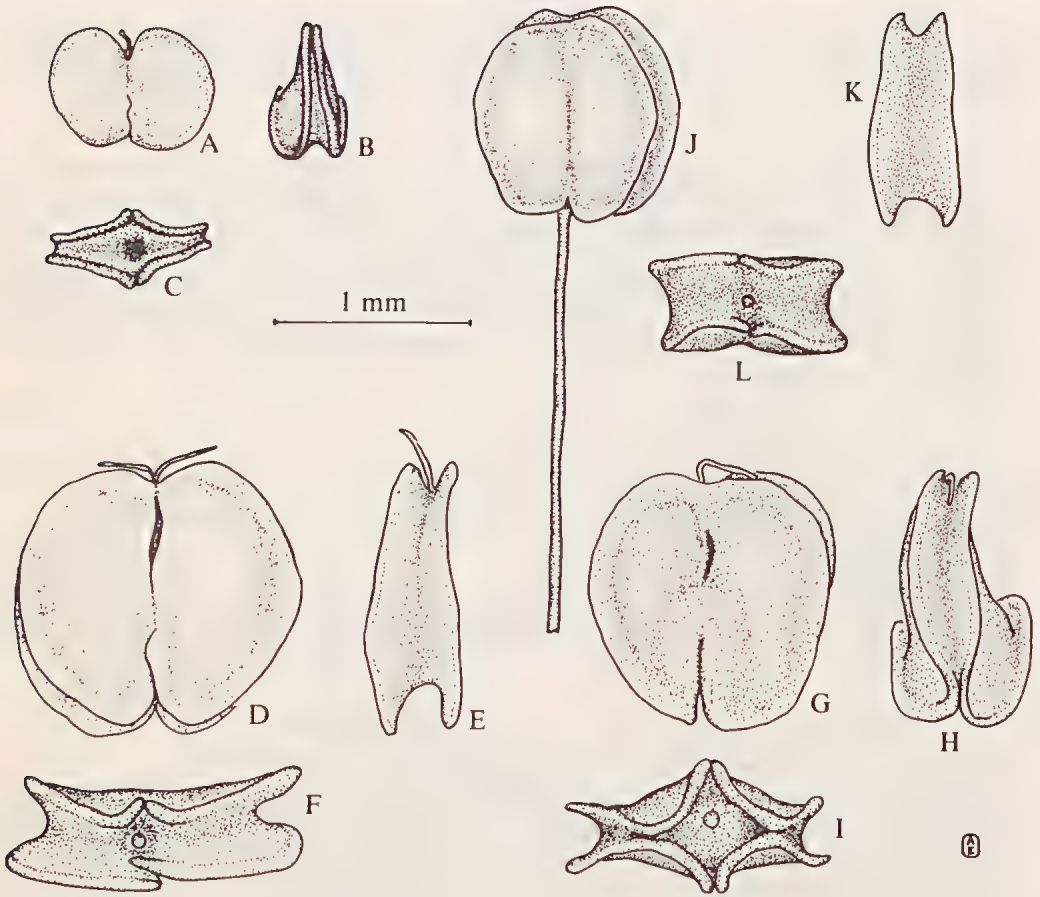


Fig. 1. Fruits of South Australian *Callitriche* (all to same scale). A-C, *Callitriche sonderi*. A, face view. B, side view. C, viewed from below. D-F, *Callitriche stagnalis*. D, face view. E, side view. F, viewed from below. G-I, *Callitriche umbonata*. G, face view. H, side view. I, viewed from below. J-L, *Callitriche hamulata*. J, face view. K, side view. L, viewed from below. (A-C. Alcock s.n., AD 97041044. D-F. Eichler 14337. G-I. Kraehenbuehl 476. J-L. Alcock 5.)

2. *C. stagnalis* Scop., *Fl. carniolica* ed. 2, 2:251(1772).

Published illustrations: Schotsman (1954) pl. 9a; Mason (1959) fig. 10 (a-b), fig. 10A (a-e); Aston (1973) fig. 20 (a-g); Burbidge & Gray (1976) fig. 245.

Relatively robust plant, amphibious, leaves variable, from linear-spathulate through obovate to almost circular, (2.5-)7(-25) mm long, (1-)6(-9) mm wide, 3-, 5- or 7-nerved, upper leaves forming a rosette. Flowers solitary or male and female occurring together, bracteoles conspicuous and persistent, lanceolate, 0.8-1.5 mm long, white. Stamens 1.4-2.0 mm long. Styles 2.5-3.5 mm long, erect, becoming recurved in fruit. Fruit pale buff, about as long as broad, 1.2-1.7 mm diam., wing broad and running around the base and also usually the top of each nutlet, commissural groove wide and deep, faces of fruit  $\pm$  flat. (Fig. 1, D-F.)

The largest of the *Callitriche* species in Australia, probably introduced, and found throughout the temperate regions of all States in damp places. In South Australia *C. stagnalis* is confined to the Mt Lofty and southern Flinders Ranges.

3. *C. umbonata* Hegelm., *Verh. bot. Ver. Brandenb.* 9:19 (1867).

Published illustrations: Mason (1959) fig. 5 (a-c), fig. 5A (a-b); Aston (1973) fig. 18d.

Amphibious herb, leaves in aquatic plants of two types. Lower leaves linear, 5-10 mm long, 0.4-0.5 mm wide, tapering to tip, emarginate, with a single midvein. Upper (rosette) leaves ( $\pm$  orbicular to) obovate, 6-8 mm long, 1.5-2.0 mm wide, with a broad petiole, 3-5-nerved. Flowers solitary in the axils of opposite leaves, bracteoles conspicuous and persistent, ca 0.7 mm long, white. Stamen with filament lengthening up to 3.5 mm long. Styles (0.6-) 1-2 mm long, spreading, deciduous. Fruit dark brown to grey, usually slightly longer than broad 1.1-1.5 mm long, 1.0-1.2 mm wide, wing narrow, pale brown and running around top, base and lower, inner edge of nutlets; the wings and edges of nutlets at base somewhat swollen and pressed against each other to form a prominent projection. (Fig. 1, G-I.)

Formerly known only from southern New South Wales, Victoria and northern Tasmania. There is one undoubted record from the south-east of South Australia (*Kraehenbuehl* 976, Wandillo road turnoff from main Mt Gambier to Glencoe West highway, 10.x.1963) and three other collections from the southern Mt Lofty Range that are somewhat intermediate between this species and *C. stagnalis* (*Cleland s.n.*, National Park, 8.xii.1962, AD 97233002. - *Cleland s.n.*, Mt Compass, 23.ii.1963, AD 96405205. - *Ising s.n.*, Stirling West, 26.xii.1956, AD 95707004).

The distinction between *C. umbonata* and *C. stagnalis* rests on two characters: the lower (submerged) leaves which in *C. umbonata* are linear and 1-nerved compared with spatulate and 3-nerved in *C. stagnalis*, and the umbonate swelling on the lower face of the *C. umbonata* fruit compared with the  $\pm$  flat faces of the *C. stagnalis* fruits. The intermediate specimens referred to above have umbonate fruits but no sign of the lower linear leaves. I believe that they are anomalous specimens of *C. umbonata*, perhaps growing in a non-inundated situation. *Callitriche* is notoriously variable in its vegetative characters, and it has been shown experimentally (Schotsman, 1954) that some European species which, like *C. umbonata*, have linear leaves in the lower parts of the stem when growing in water sometimes fail to develop them when growing in a terrestrial environment.

4. *C. hamulata* Ktze, in Koch, Synops. Fl. germ. et helv. ed. 1, 1:246 (1835)

Published illustrations: Schotsman (1954) pl. 7a, 13a, 14a, 16a; Mason (1959) fig. 11 (a-b); fig. 11A (a-c); Aston (1973) fig. 19 (a-d).

Aquatic or terrestrial herb, leaves in aquatic plants of two types. Submerged leaves linear, 6-30 mm long, 0.5-1.0 mm wide, deeply notched at tip, with a single midvein. Rosette leaves spatulate, ca 3-4 mm long, 1.3-1.7 mm wide,  $\pm$  emarginate, 3-nerved. Leaves of land form linear-elliptic to elliptic, 1(-3)-nerved. Flowers solitary in the leaf axils, bracteoles absent or rarely present. Stamen 0.6-1.0 mm long, styles deflexed close to fruit, deciduous. Fruit sessile or on pedicel to 15 mm long, dark brown to greyish, longer than broad, or nearly circular, 1.1-1.2 mm long, 0.9-1.0(-1.4) mm wide, pale narrow wing running around top and base of nutlets, commissural groove broad and shallow, face of fruit  $\pm$  flat. (Fig. 1, J-L.)

A European species introduced to New Zealand, Victoria and now South Australia. Only one South Australian collection has been made so far, from the south-eastern part of the State near the Victorian border (*Alcock* 5, Comaun, Dec. 1973). Aquatic plants of this species are easily identified as in the key. Terrestrial plants might key to *C. stagnalis* but are distinguished by their lack of bracteoles and dark coloured, usually pedicellate fruits.

#### Acknowledgements

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#### References

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